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Higher Education

Features for FEBRUARY–MARCH 1961

Ten-Year Objectives in Higher Education Staffing

1960-61 Through 1969-70

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Office of Education

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Ten-Year Objectives in Higher Education Staffing 1960–61 Through 1969–70

This paper is a somewhat shortened version of part 1 of Ten-Year Objectives in Education, Higher Education Staffing and Physical Facilities, 1960–61 Through 1969–70, *prepared by the Office of Education at the request of Arthur S. Flemming, then Secretary of Health, Education, and Welfare, and released January 19, 1961. Part 1 of the paper deals with staffing needs, and part 2 deals with the needs for physical facilities. Part 2 has not been included in this issue of* Higher Education, *since the material covered has had wide distribution as testimony presented by representatives of the Department of Health, Education, and Welfare, before subcommittees of both the U.S. Senate*[1] *and the House of Representatives*[2] *of the 86th Congress.*

The complete staff paper, including parts 1 and 2 in their entirety, may be obtained upon request from the Publications Inquiry Unit, Office of Education, U.S. Department of Health, Education, and Welfare, Washington 25, D.C.

Introduction

In seeking to draw national attention to the financial needs of any social institution, one needs to be as explicit as possible concerning the relation of that institution to the public interest. Higher education has long been recognized by our citizens generally as an important constructive element in our national life. The Nation's welfare hinges so specifically on the progress of higher education during the next decade, however, that every responsible citizen must be persuaded to give careful attention to its needs.

American higher education has shown an extraordinary adaptability in developing concepts of education, types of institutions, and programs of instruction suitable to the rapidly multiplying and diversifying needs of an expanding technology and to the constantly rising economic expectations of our people. It must carry an even greater share of responsibility in meeting the tremendous challenge the American people face in the coming years. While the threat of opposing military and ideological forces in the world lends urgency to the task, the task would exist in any case. It derives from the immense complexity of the life which our advances in learning have directly and indirectly brought about and which necessitates the fullest possible development of the abilities of every young American.

One of the ways in which this challenge is most readily seen is the increasing need for more and better qualified recruits for virtually every general occupational category except unskilled labor. The proponents of a significant number of professions besides the academic are already finding cause to complain that they are not receiving their due share of the more promising members of the annual crop of college-educated youth. A mere moment's reflection on this point leads to two conclusions: (1) that more youth of above-average ability must be induced to enter the mainstream of intellectually demanding endeavor, and (2) that the educational achievement of all youth must be so raised that as adults they will ultimately be able to meet occupational chal-

[1] *Federal Assistance to Higher Education* (Hearings before the Subcommittee on Education of the Committee on Labor and Public Welfare, U.S. Senate, 86th Cong., 2d sess., June 13, 17, 20, and 21, 1960). Washington, U.S. Government Printing Office, 1960. 255 p.

[2] *College Classroom Construction* (Hearings before the Subcommittee on Special Education of the Committee on Education and Labor, House of Representatives, 86th Cong., 2d sess., Mar. 21, 23, 24, and 25, 1960). Washington, U.S. Government Printing Office, 1960. 191 p.

lenges far above those that the average adult of the same age would have had occasion to meet a generation ago.

Our more recent knowledge of human development strongly suggests, if it does not conclusively demonstrate, that man has much higher levels of individual potential than those he has reached thus far. The democratic American experiment in education has already indicated the potential range of organized instruction for the development of human talents; in the years immediately ahead it must seek to accomplish in depth of development—or, rather, in height of excellence—the equivalent of what it has accomplished in breadth of application. Both the survival of the Nation as we know it and the fulfillment of what we tend to consider its historic mission in the world demand our continued and intensified effort to establish a higher base of educational development than we have ever thought possible.

Colleges and universities of today have the task not only of instructing students but of encouraging and directing research, both in the individual pursuit of learning, which is basic in the life of every scholar, and in complex team projects conducted in behalf of government and industry, which require special financing, organization, and administration.

The National Objective

To insure, over the next decade, a professional staff for institutions of higher education, (1) adequate in number to meet enormously increased quantitative demands, (2) sufficiently well trained to maintain at least the present quality of instructional and research activities, and (3) adequately compensated for the vital role of instructing the young and advancing the frontiers of human understanding.

The achievement of this objective will require major efforts in four dimensions:

1. An increase in the number of teaching and administrative personnel sufficient to provide instruction and services to greatly expanded enrollments in the Nation's colleges and universities.
2. A doubling of the 1957–58 average rate of compensation for all professional staff persons in higher education.
3. A doubling of the number of persons engaged in organized research within the complex of American higher education.
4. A greatly increased investment in the productive machinery upon which all of higher education relies; namely, graduate school programs for the training of highly specialized personnel.

This paper will endeavor to outline specifically what is required in order to meet professional staff needs.

The Problem of Staffing

Projections of population growth and college entrance rates indicate that approximately 6,006,600 students will attend higher education institutions in 1970, and that about 4,504,500 of this number will attend full time. This estimated increase of 2,600,000 students, of whom 1,952,777 are expected to attend full time, forms the basis for the projections in this paper of the requirements for staffing the Nation's colleges.

American colleges and universities, having assumed increasing responsibility for leadership both at home and abroad, are encountering mounting difficulty in meeting the demands for higher trained manpower placed upon them by business, government, and industry. Today about 350,000 professional persons (about 272,000 full-time equivalent) are engaged in providing the teaching, research, management, and administrative services in higher education.

During the next 10 years about 336,000 new, trained professional staff members must be recruited by the Nation's colleges and universities (at the master's and doctor's degree level) to replace those lost by death, retirement, and resignation and to accommodate increases in enrollment. The Nation's graduate schools must train not only these persons but also the far larger numbers of similarly trained people required for business, industry, government, and other areas. They must produce persons at the level of the doctorate at a greatly increased rate in order to avert serious deterioration in the level of academic training of the staff of higher education, as it grows in size to keep pace with mounting enrollments.

The percentage of doctor's degree holders among entering staff members in institutions of higher education declined from 31.4 percent in 1953–54 to 23.8 percent in 1958–59. It is estimated that to reestablish this proportion at 30 percent for the period

1960–70, the Nation's graduate schools must award a projected average of 16,800 doctor's degrees annually during the decade, compared with the current rate of about 9,600, and a projected 10-year average of 13,300 indicated by present trends. Even the goal of 16,800 new doctor's degree holders per year will be insufficient unless improved balance between supply and need by fields is achieved, and unless at least 60 percent of those receiving the doctor's degree accept positions in higher education.

The problem of recruitment of staff for higher education will become increasingly serious, at both master's and doctor's degree levels, unless salaries in colleges and universities are increased during the next decade at an unprecedented rate. The increases in salary of professional staff in higher education during the last 5 years fall far short of restoring the economic ground lost by the profession since 1940.

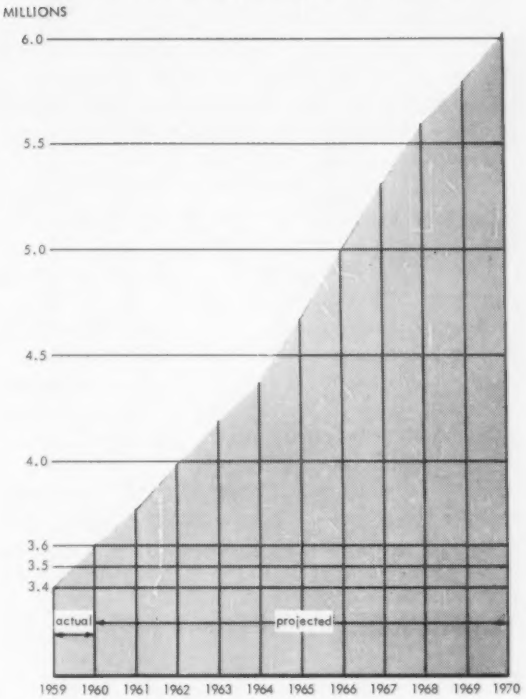
Professional Needs To Handle Increasing Enrollment

Chart 1 presents anticipated enrollment increases, undergraduate and graduate, in American higher education between 1959 and 1970. An examination of this chart will disclose that the rate of enrollment increase is not constant, but that it reflects the irregular characteristics of the birth rate of the past. The projected rise in enrollment also assumes a continued modest increase in the percentage of college-age youth who will be enrolled in college, an increase that simply reflects the historic pattern. In 1939, college enrollments equaled only 14.3 percent of college-age youth; in 1959, this percentage figure was 37.1; the projection embodied in chart 1 assumes that by 1970 it will have grown to 41.2.

It is obvious that an increase in college and university enrollments from approximately 3.5 million in 1960 to more than 6 million by 1970 will place an extraordinary strain on our higher educational enterprise. If the quality of higher education is not to suffer seriously, the number of persons instructing college and university students, and the number of administrative staff members performing other essential services must rise in some measure to meet these enrollment increases.

It is estimated that the full-time equivalent of 232,000 faculty and administrative staff members are now employed to provide instruction and services

CHART 1.--TOTAL FALL ENROLLMENT, DEGREE-CREDIT STUDENTS



to 3.5 million students. The projections of staff requirements in this study, however, are premised upon an increase in average class size and teaching load in the coming decade, resulting partly from new instructional methods, partly from improvements in the utilization of teaching personnel, and partly from the increase in class size which generally accompanies increases in enrollment.

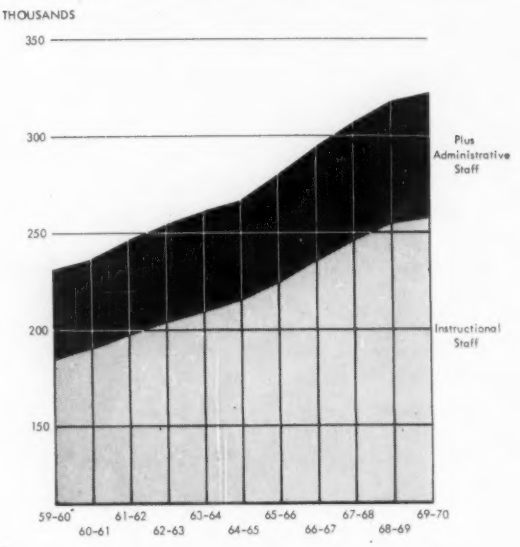
The Office of Education has assumed, and has found among consultants general concurrence in the assumption, that the student-staff ratio will rise during the next decade by about 20 percent. This ratio compares the academic year enrollment of degree-credit students (both full time and part time, undergraduate and graduate) with the full-time equivalent of administrative and instructional staff members. A different ratio would, of course, be required if nondegree students were included, if research staff were included, or if staff members were not converted to full-time equivalent. The ratio, in other words, varies in accordance with the particular concepts or definitions employed in its

derivation. The 20-percent rise in student-staff ratio is assumed in spite of the likelihood that an increase in the proportion of graduate students and an increase in curricular diversities corresponding to continuing increase in knowledge would tend to produce a change in the other direction. A larger rise in the projected student-staff ratio could not, in our judgment, be assumed without building into the academic structure a planned reduction in the quality of instructional services.

Chart 2 presents in graphic form the full-time equivalent of aggregate staff required in each of the next 10 years to provide teaching and administrative personnel commensurate with increasing total enrollment. Reflected in this projection of teaching and administrative staff needs is an assumed gradual increase in the student-staff ratio. It should be emphasized that these figures represent the numbers required to be on duty in order to provide adequate services to students. They should not be interpreted as indicating annual employment needs, since the latter are augmented by the need to replace persons lost to the profession through death, retirement, disability, and movement to other professions. It should be kept in mind that the actual number of individuals employed at a given time is substantially larger than the full-time equivalent. Chart 2 simply indicates the number of teaching and administrative personnel required at any given point in time to provide teaching and other services required by advancing enrollments under the assumed gradual rise in the student-staff ratio.

A reading of chart 2 indicates that in 1969–70, a total teaching and professional-level administrative staff of approximately 322,000 will be required. The percentage of this number that will be engaged in essentially administrative duties, including student services and library staff, is *assumed* to be the same as the percentage prevailing today, namely 20 percent of total professional staff, or 25 percent of the total of instructional and administrative staff (excluding research). The percentage of persons engaged in essentially full-time teaching, would therefore represent 80 percent of the total at any given point in time. In this paper the phrase "professional staff" includes (*a*) professional staff for administration (including professional staff for student personnel and professional library staff); (*b*) professional staff for resident instruction in degree-credit courses (excluding junior instructional staff below the rank

CHART 2.--PROJECTED PROFESSIONAL STAFF TOTALS, FULL-TIME EQUIVALENT (1)



of instructor); and (*c*) professional staff for organized or separately budgeted research (including staff at university institutes or research centers).

A net increase in full-time equivalent teaching and administrative personnel (excluding research) from 232,000 to 322,000 in the next decade represents a net increment of 90,000 professional persons. It cannot be emphasized too strongly that the problem is more than a matter of training and adding to staff 90,000 persons. In order to effect a net increase of these proportions, it will be necessary in any given year to effect a gross increase in the number of persons entering higher education that is significantly greater. For example, let us take a 1-year interval on chart 2. Between the years 1965 and 1966, it is anticipated that an enrollment increase will be experienced in the amount of approximately 330,000. If the student-staff ratio changes at the assumed rate, it will be necessary to increase teaching and administrative personnel by a net figure of approximately 13,900 full-time persons. *But* a significant percentage of those persons engaged in teaching and administrative work during the earlier of these 2 years will be lost to the profession through retirement, death, disability, or transfer into other occupations. This annual rate of turnover has been estimated by the National Education Association to be approxi-

mately 6 percent per year.[3] The replacement of 6 percent of the 1965–66 teaching and administrative staff would therefore require the employment of the equivalent of 16,852 full-time teachers and administrators, *in addition to* the 13,900 required to cope with increased enrollment. Thus it should be borne constantly in mind that chart 2 reflects only the number of full-time staff required on duty, and does not reveal, except upon analysis, the number of full-time professional persons that must be recruited for new employment in any given year.

Professional Staff Needs for Organized Research

It has been observed that American higher education is growing not only broader but higher. As the complexities of modern life are revealed to us and the frontiers of learning advance, the Nation's higher education enterprise, and particularly its universities, place greater and greater emphasis upon advanced learning and research. In the brief period of time since the conclusion of World War II, the Nation's universities have become a major research enterprise. In 1957–58 approximately 30,000, or about 12 percent, of all full-time-equivalent professional staff in the Nation's colleges and universities were engaged full time in the pursuit of organized (or separately budgeted) research;[4] by 1959–60, the estimated full-time-equivalent had advanced to approximately 40,000, or about 15 percent of the total.[5] Annual expenditures for organized research in colleges and universities are now close to the $1 billion mark.[6] Thus no consideration of higher education staffing needs can overlook the demands for personnel to be engaged in organized research.

The extent to which organized research will grow as a component of our total higher educational enterprise in the coming decade is a matter of speculation. Certainly the rate of growth in the last decade has been nothing short of phenomenal. A simple projection of this rate of growth would indicate staff needs for organized research of an incredible order of magnitude. The situation is such as to discourage the application of purely statistical techniques in forecasting the future, and to favor the use of informed judgment.

Several factors will likely combine to reduce the recent rate of growth in organized research in American higher education. First of all, Federal expenditures currently account for over 70 percent of all organized research undertaken in the Nation's colleges and universities. With such dramatic dependence upon a single source of financial support, unlimited further growth cannot be assumed. The Federal Government does not and need not conduct all of its research through colleges and universities, and the fact of the matter is that there are real if elusive limitations on the amount of Federal funds that can and will be authorized for such purposes. Secondly, organized research is conducted for the most part in research-oriented institutions equipped with elaborate facilities and staffed with highly trained persons—which is to say, the Nation's universities. Few of the strictly 4-year institutions and none of the Nation's growing component of 2-year institutions are engaged in organized research. There are 165 institutions in the United States that granted one or more earned doctor's degrees in 1958. It is fair to assume that these constitute substantially the universe in which organized research is and will be undertaken. While it is true that there is no visible limit on the amount of organized research that can be undertaken by a single university (some of which already devote more than 75 percent of their total educational and general income to such

[3] National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1957–58 and 1958–59.* Research Report No. 1959-R10. Washington, the Association, 1959. p. 53.

[4] The number of different persons engaged in organized research in institutions of higher education in 1957–58 was reported to the Office of Education as 32,531 (Office of Education Circular 596, p. 3). This includes part-time professional staff, as well as full time; the full-time-equivalent figures would therefore be lower. A factor tending in the opposite direction, however, is the known underreporting of professional staff at university institutes or research centers. The degree of balancing of these two factors can only be estimated; the approximate figure of 30,000 given in the text is offered as a reasonable judgment.

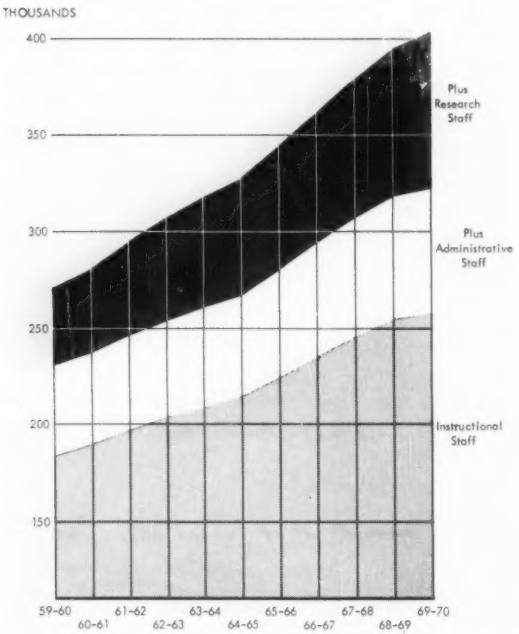
[5] The rise from 30,000 to 40,000 is based principally on the estimated rise in expenditures for organized research from about $720 million to $1 billion (National Science Foundation, "Funds for Research and Development in Colleges and Universities, 1953–59." *Reviews of Data on Research and Development*, No. 16, December 1959). The estimated 33 percent rise in staff is deliberately smaller than the roughly 40 percent rise in expenditures, partly because the dollar expenditures reflect some degree of inflation, and partly because it is assumed that expenditures for other factors, such as equipment and nonprofessional staff, have risen more rapidly than for professional staff.

[6] "Funds for Research and Development . . .," op. cit.

purposes), it is not unreasonable to assume that these institutions will seek to establish and maintain a balance in their total program between organized research and the teaching function. This would suggest the eventual development of ceilings on the extent of organized research in an individual institution.

It has therefore been *assumed*—despite the fact that gross expenditures for organized research have grown by 300–400 percent during the last decade—that the next decade will witness a simple doubling of persons in organized research. Chart 3 indicates the effect that a doubling, over the next 10 years, of

CHART 3.--PROJECTED PROFESSIONAL STAFF TOTALS, FULL-TIME EQUIVALENT (2)



full-time staff engaged in organized research would have upon total staff required to man the higher educational enterprise. The net increase in full-time-equivalent professional staff engaged in organized research, from 40,000 at present (roughly 15 percent of total professional staff—see p. 6 for definition) to 80,000 (or nearly 20 percent of total professional staff) in the year 1970, has been distributed evenly over the 10-year period. The caution stated previously must be reiterated here: The annual net increment in number of persons *engaged* in organized research is not the same as the number of new persons that must be *hired* in a given year.

Chart 3, then projects a picture of the higher education staffing pattern for the decade ending 1969–70. The chart indicates the number of full-time persons required to meet the projected demands for instructional and administrative services and for the growing program of organized research. These projections indicate a total full-time-equivalent professional staff in American higher education, as of 1970, of some 402,000. Of this total, 258,000, or 64.2 percent, will be engaged in essentially full-time teaching; 64,000, or 16.0 percent, will be engaged in the provision of administrative services; and the full-time equivalent of 80,000, or 19.8 percent, will be engaged in the pursuit of organized research.

Financial Implications

A great deal of concern has been expressed, and properly, with regard to the rate of compensation afforded college and university professional staff members. A part of this concern has stemmed from the fact that faculty salaries have not proved to be competitive with salaries for persons with similar training and abilities in nonacademic fields. While the competitive salary factor is not uniform, there is wide agreement that the absence of satisfactory pay scales in academic life has proved a deterrent to the recruiting of adequate numbers of college and university staff of the desired quality. This competitive disadvantage has been most marked in fields of manpower shortage, such as the sciences and engineering, but it has broad applicability in all academic fields. The able college graduate who might be qualified for college teaching or research frequently overlooks or disregards a possible career in higher education, in view of the long years of expensive preparation required and the absence of an adequate career salary.

During the last decade, a number of studies revealed the shrinking value of faculty compensation. The shocking findings of some of these surveys offended many people's sense of equity. The disclosure that inflation had eaten so far into the already modest income of professors prompted a flurry of activity during the latter years of the last decade. Most dramatically evident in the bold philanthropy of the Ford Foundation, efforts to raise faculty salaries have been successful in more than a merely symbolic

sense. Increases in faculty salaries during the last 5 years compare favorably with salary increases in comparable professional fields. But these recent increases fail to reflect the true economic status of faculty members. Viewed over a longer period of time, as for example the period since 1940, the professional staff of institutions of higher education has lost economic ground in relation to persons in comparable professional fields.[7]

One of the most eloquent and forceful arguments for increased faculty compensation was contained in the report of President Eisenhower's Committee on Education Beyond the High School, presented to the public in the summer of 1958. That report said in part:

> The plain fact is that the college teachers of the United States, through their inadequate salaries, are subsidizing the education of students, and in some cases the luxuries of the students' families, by an amount which is more than double the grand total of alumni gifts, corporate gifts, and endowment income of all colleges and universities combined. This is tantamount to the largest scholarship program in world history, but certainly not one calculated to advance education. Unless this condition is corrected forthwith, the quality of American higher education will decline. No student and no institution can hope to escape the consequences.

The President's Committee on Education Beyond the High School recommended that, as a matter of equity and in order to insure a sufficient competitive strength to academic careers, the average rate of compensation for college and university staff should be doubled "within 5 to 10 years." The cogency of the Committee's argument was such that wide consensus has been achieved in support of this goal. It has been *assumed* therefore, for the purposes of this study, that doubling the average annual rate of compensation for all professional staff in institutions of higher education is a justifiable national goal.

An effort has been made to project the annual cost of maintaining a professional staff of the size estimated to be needed by 1969–70 at the desired rate of compensation. This calculation is based not on salary alone but on total compensation, on the thesis that so-called fringe benefits are as important to faculty members as they are to others, and that they must therefore be encompassed in such a projection.[8] Likewise, no assumption has been made with regard to possible future inflation. The dollar projections made here and elsewhere in this paper are based on dollars of constant purchasing power, and any inflation would necessitate a corresponding adjustment in the figure.

Let us examine the pattern of institutional expenditures for professional staff in the year 1957–58, the year in which the President's Committee recommendation was shaped. Table 1 indicates the number of persons (expressed in terms of full-time equivalents) engaged in the areas of administration, teaching, and organized research, and the mean expenditures per person for salary and other benefits.

Table 1.—Total staff and expenditure, 1957–58

Staff	*Number*	*Mean expenditure*	*Total expenditure*
Instructional	177,492	$7,300	$1,295,691,600
Administrative	44,373	9,124	404,859,252
Research	30,000	8,212	267,145,000
Total	251,865	7,813	1,967,695,852

In table 1 the mean expenditure for instructional staff was obtained by adding the average fringe benefits (see footnote 8) for 1957–58 to the average salary for that year (OE data, unpublished). In accord-

[7] From 1940 to 1954, in real income before taxes, while salaries of physicians, industrial workers, and lawyers increased 80 percent, 48 percent, and 10 percent, respectively, salaries of faculty members decreased 5 percent. (Source: D. M. Keezer, *Financing Higher Education, 1960–70*. New York: McGraw-Hill Publishing Co., 1959. p. 10.)

From the 1930's to 1956–57, the pay of a full professor in stable dollars at Yale, Columbia, Johns Hopkins, and Harvard decreased about 20 percent; in the same period the salary of an average member of the labor market rose 50 percent in stable dollars. (Source: Keezer, op. cit., p. 71.)

The following average salary levels for full-time scientists in 1957–58 indicate the relative financial position of scientists in education:

Overall median salary for scientists	$7,900
Scientists in industry	9,200
Scientists in miscellaneous, nonprofit organizations	7,900
Scientists in Federal Government	7,500
Scientists in education	6,800
Scientists in State and local government	6,500

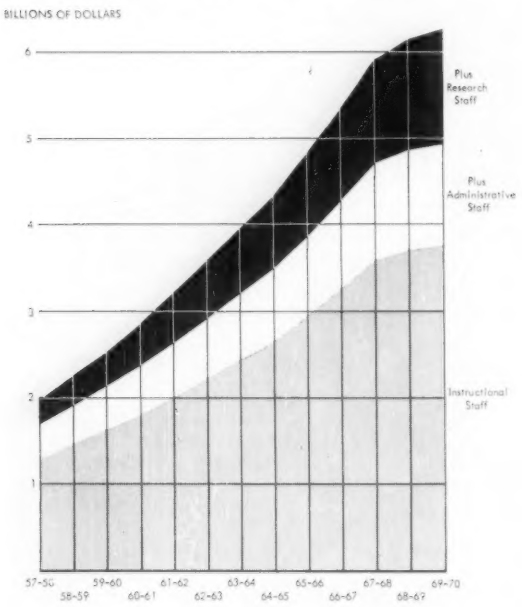
(Source: National Science Foundation, "National Register of Scientific and Technical Personnel, 1956–58." *Scientific Manpower Bulletin*, No. 11, April 1960.)

[8] Total compensation, including fringe benefits, was arrived at by an 18.4-percent increase of the annual salary figures published regularly by the Office of Education. The increase, representing fringe benefits, was determined from data on faculty salaries and benefits in 323 institutions, as reported in "The Economic Status of the American Association of University Professors," *Bulletin*, summer 1960, p. 156–173.

ance with results of estimates and computations, average expenditures for administrative staff were assumed to be 125 percent of average instructional staff expenditures; for the research staff, they were assumed to be 90 percent of the expenditures of the administrative staff.

Chart 4 assumes that these average rates of compensation will be doubled as of 1968 (10 years after the President's Committee recommendation), and further assumes that the rate of compensation will increase evenly over the intervening span of years. The mean expenditure per person in administrative work is assumed to be $18,248, or double the mean expenditure of 1957–58. Similarly the mean expenditure per person on the teaching staff is assumed to be $14,600 and that per person in organized

CHART 4.—PROJECTED ANNUAL EXPENDITURE FOR PROFESSIONAL STAFF



research, $16,424. These average levels of compensation, multiplied by the numbers of full-time persons estimated to be employed in each category by 1970, bring the projected annual institutional expenditures for professional staff salaries up to approximately $6 billion, which is more than three times the total expenditures for these purposes in 1957–58.

Therefore, in order to reach the 10-year previously stated objective in higher education staffing, annual expenditures for salaries and related benefits for professional staff persons in all institutions of higher education must be raised to $6 billion by 1970. Only a budget of this impressive size will permit the Nation's colleges and universities to engage the numbers, types, and quality of persons required at a level of compensation suited to their training, ability, and importance.

No attempt has been made in this report to project the total annual cost of higher education during the next decade, or to estimate the proportions of the necessary revenue that will be provided by various sources. Without a doubt, as expenditures for staff are increased and as facilities are expanded to accommodate growing enrollments, all other costs will rise as well, though not necessarily in direct proportion. The total annual budget for higher education, by 1970, will undoubtedly have reached a figure several times as large as that of 1960. Which sources of revenue will be expanded most, and the extent to which new sources are developed, will be determined by the progressive crystallization of the considered judgment and concern of those responsible for those sources and a continuing adjustment of each to the mounting requirements of a growing Nation. Without a doubt it will require also the courageous identification of points at which concerted infusions of support of unprecedented magnitude must be applied in order to meet crucial needs of national scope and vital consequence.

Producing the Required Manpower

A previous section of this report dealt with the economic impact of anticipated needs in higher education staff, compounded by the need for higher levels of compensation. This section will deal with an additional aspect of the problem posed by growing professional staff needs in institutions of higher education.

It is obvious that the greatly increased numbers of persons to be engaged in the higher educational enterprise must first be prepared for their work. Higher education is almost unique in the sense that it is both the producer and one of the principal users of highly trained professional manpower. Almost all the persons who must staff our institutions of higher education, in administrative, teaching, and research positions, must themselves be products of

the higher education system of the United States.

Requirements for teaching in U.S. colleges and universities are not fixed. There are widely acknowledged instances of persons achieving great distinction in college teaching, administration, and research whose preparation has not conformed to what might be considered norms or ideals in preparation for such work. Thus, persons from other professions, businessmen, and military leaders have successfully assumed the mantle of college and university administrators. Creative artists to whom formal academic preparation was of marginal benefit have sometimes come to be brilliant faculty members; and even in the fields of organized research, professional persons lacking advanced degrees have on occasion proved of inestimable value.

Nonetheless, for better or for worse, level of academic achievement as measured in earned degrees is one of the few crude indices we have of quality in higher educational staff. An important indication of danger in this respect is the fact that the proportion of new full-time college faculty members who hold the doctoral degree at the time of entrance into teaching is declining. From 1953–54 to 1958–59, this proportion declined from 31.4 percent to 23.8 percent.[9] It is evident that increasing demands for college faculty may accentuate this downward trend in the level of training of beginning college teachers. Not only have the winners of doctor's degrees increasingly elected to pursue occupations outside the academic world, but our graduate schools have not increased their output of the doctoral degree at a rate that promises to keep pace with growing demands for highly trained professional people in all fields.

The recommended doubling of the rate of compensation for faculty members embodied in this study is designed to increase the attractiveness of academic employment. The major concern should now be directed to the rate of production of highly trained persons to fill vacancies in institutions of higher education. A major burden will soon fall upon the graduate schools of the United States, which are the producers of persons with advanced degrees.

Office of Education statistics indicate that during the last 5 years the graduate schools of the United States have produced some 44,437 earned doctorates, or an average of 8,880 per year. Of these it is estimated that only about 60 percent enter into (or continue in) higher education employment.

The extent to which this output must be increased is determined in part by annual needs for new personnel in teaching, administration, and organized research. It will be recalled that the annual increments reflected in chart 3 represent net increments in total staff, and not the need for annual hirings. In order to arrive at a figure for anticipated annual new employment, it is necessary to add to the annual increment a figure for replacement of personnel who have been lost through death, disability, retirement, and transfer to other occupations. As indicated earlier, the National Education Association has estimated this need for the teaching staff to be 6 percent annually.[10] The same figure has been used for administration, but the annual loss of research staff is estimated to be somewhat higher; namely, 7.5 percent. Thus, it is necessary to add to annual increments a figure representing 6 percent of the previous year's instructional and administrative staff, plus 7.5 percent of the staff engaged in organized research. The cumulative results of such computation are described below in chart 5.

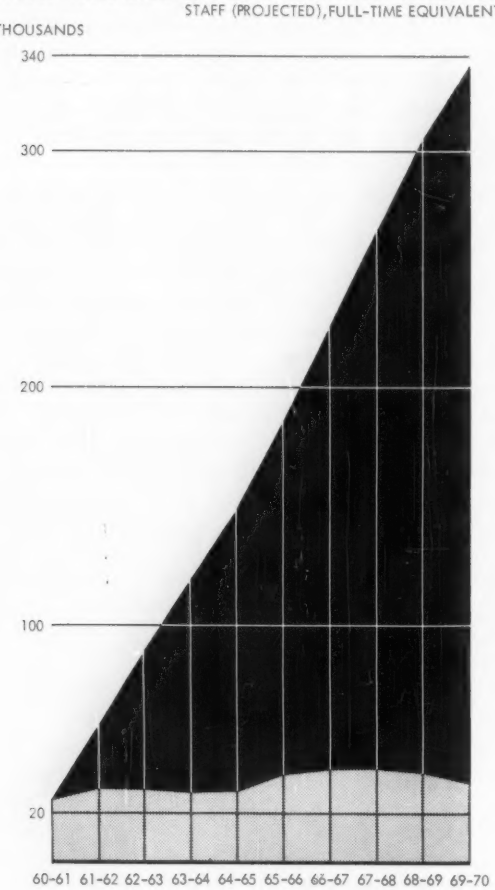
According to chart 5, institutions of higher education in the United States will need to employ about 336,000 new professional staff members during the next 10 years. At the present rate of production of doctor's degrees (about 9,360 per year), assuming that 60 percent of these take positions in higher education, only about 56,200 of the 336,000 new staff members, or 16.7 percent, will have doctor's degrees at the time they enter the profession. The extent to which doctorate production must be increased in order to maintain even the present quality of those entering the professional staff can be judged by comparing this 16.7 percent with the corresponding 31.4 percent for entering staff members in 1953–54, 26.7 percent for 1955–56, and 23.8 percent in 1958–59.

If it is *assumed* that 30 percent of new staff members should hold the doctorate in order to insure quality in higher education, and if it is *assumed* that 60 percent of all doctor's degree recipients can be counted upon to fill such positions, it is possible to project a "need" for annual doctoral output. This need is projected cumulatively in chart 6. Superimposed on this chart are a cumulative estimate of

[9] National Education Association, op. cit., p. 11.

[10] National Education Association, op. cit., p. 53.

CHART 5.--ANNUAL AND CUMULATIVE NEED FOR NEW PROFESSIONAL STAFF (PROJECTED), FULL-TIME EQUIVALENT



doctoral degrees as developed by the Office of Education and a projection of the cumulative effect of the present annual rate of output. The comparison of cumulative need with estimated cumulative output identifies the order of magnitude of the "quality gap" that is threatened in higher education if we do not as a Nation take steps to accelerate and increase the output of doctorates.

The Office of Education projection of earned doctorates offers some hope that supply will eventually catch up with demand.[11] In 1968, it projects the award of 17,400 doctorates which, assuming 60 percent are added to full-time staff in higher education, would provide the equivalent of 36 percent of the new persons needed in the following year, or better than the assumed target of 30 percent. The problem is, therefore, to bring about a foreseeable growth in the Nation's graduate schools *in time to provide quality staff when they are needed.* The eventual doubling of the output of doctorates, as projected by the U.S. Office of Education, must be accelerated.

The strain on the Nation's graduate schools of such a redoubled effort is obvious. It is estimated, for example, that current annual expenditures for graduate fellowships amount to some $35 million. It may fairly be presumed that this amount will have to be at least doubled to maintain graduate student enrollments at the desired level. An increase of this order of magnitude in the annual budget for graduate assistance will call for a major and virtually immediate increase in support for these purposes from the several agencies, organizations, and institutions interested in and taking part in the encouragement of graduate education.

One further consideration is of vital importance. Not only does the gross output of the Nation's graduate schools need to be greatly increased, and not only do the annual expenditures for such items as student assistance need to be increased commensurately, but also much greater efficiency in the production of fully trained graduate students must be effected. Not only do we need to train individual graduate students more rapidly (the minimum number of years required for the doctorate is three, but it has been estimated that it takes the average graduate student between 7 and 8 years to earn his degree), but efforts must also be made to produce doctor's degrees *in the fields for which there is demand for them.* It is not the intention of this paper to suggest that the selection of fields of study and the award of doctoral degrees should be made in accordance with some master plan; on the contrary, the importance of free choice on the part of the individual cannot be overestimated. It is nonetheless true that the estimates for needed doctorate output in the United States contained in this paper are based on the assumption that recipients of this advanced degree will receive their training in fields in which there is demand for persons trained to the level of the doctorate. There is ample evidence that current patterns of doctorate production do not coincide with the Nation's needs for persons with doctor's degrees.

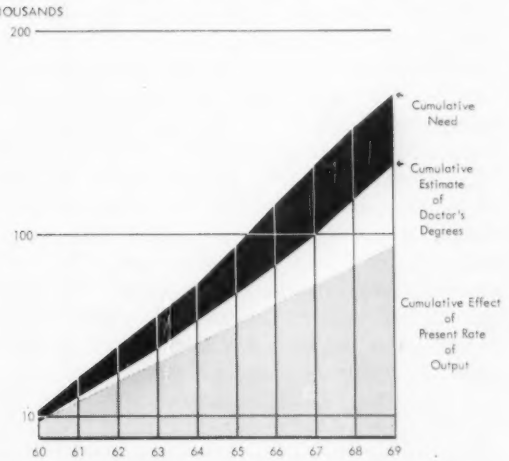
[11] Louis Conger and Marie G. Fullam, *Projection of Earned Degrees to 1969–70*, Circular No. 54002, U.S. Department of Health Education, and Welfare, Office of Education. Washington: U.S. Government Printing Office, September 1959. p. 5.

To the extent that there is overproduction in some academic areas and underproduction in others, either a better balance must be achieved or the projections in this paper must be modified upward for the fields of greatest underproduction.

As has been indicated earlier, there are in the United States some 165 institutions which awarded one or more doctoral degrees in 1958. The need to double the output of doctorates will create a significant strain upon these institutions. It has already been suggested that a dramatic increase in expenditures for fellowships will be required. It remains also to be seen whether or not these institutions alone can produce the requisite numbers of doctoral degree holders. On the basis of a recent survey, the Office of Education estimates that there exists in established graduate schools today the academic and physical capacity to accommodate some 20,000 additional doctoral candidates. These vacancies do not, of course, necessarily exist in fields for which there is an unsatisfied current demand for doctor's degrees. Nonetheless, it can be argued that a significant increase in the annual output of doctorates could be effected, without increase in faculty or facilities of existing institutions, simply by applying resources now incompletely utilized.

Some of these spaces could effectively be filled by persons now engaged in teaching who have not completed the work for their doctorate. A recent Office of Education survey indicated that graduate school deans felt they could identify at least 4,000 such persons who could earn their doctorates if supported for 1 full year of additional graduate work. The conversion of these so-called A.B.D.'s (those who have completed "All But the Dissertation") into persons with doctor's degrees, though it would be a onetime phenomenon, would represent a constructive step in assuring standards of quality in higher education.

CHART 6.--CUMULATIVE NEED FOR OUTPUT OF DOCTORS DEGREES



But full utilization of the existing capacity of the established graduate schools will still leave a gap between graduate training needs and resources that can be filled only by expansion. Title IV of the National Defense Education Act of 1958 represents an admirable example of efforts to broaden the base of graduate education and thus enlarge the basic productive machinery of prospective college and university staff members. It is highly doubtful, however, that the fellowships and matching grants currently authorized under that program are sufficent to meet the demands heretofore described. Clearly, additional major effort is required of all interested parties and agencies if our graduate education enterprise is to meet the demands placed upon it.

Summary

To achieve the 10-year objective in staffing will require, first, that the regular faculty and professional administration associated with college and university instruction be increased over the next 10 years from 232,000 in 1959–60 to 322,000 by 1969–70, and that their average annual compensation, including fringe benefits, be increased from the present $8,600 to $15,400. This means a total national cost—without reference to the respective shares of the private, municipal, State, and Federal sources—of $4.93 billion in 1969–70, or nearly $3 billion more than the present annual expenditures of all our higher institutions for this purpose. In addition, it will be necessary to increase the professional staff engaged in sponsored research (other than regular instructional faculty) from the present 40,000 to a full-time equivalent of 80,000 by 1969–70. The salary cost of this achievement will be proportionately as great as for the staffing of the regular instructional establishment.

A large increase must be brought about in the size of the total graduate school segment of higher education in order to meet the highly selective and highly trained manpower needs of the Nation's eco-

nomic and industrial life, of the various levels of government, and of the educational community itself. This increase, which will require heavy financial support, overlaps only partly the commitments for staffing previously described.

The enormity of the undertakings just described is self-evident. They do not, however, embrace the entire scope of problems in the support of higher education, and the fact that this document concentrates on staffing should not be interpreted as suggesting neglect of such areas as physical facilities, student assistance, and the support of college libraries, art collections, laboratories, and other essentials of instruction, as well as extension, adult education, and other public service activities. Similarly extended efforts must be made in all areas of higher educational need if the total enterprise is to prove equal to the quantitative demands of the student population and to the qualitative demands of the era in which we live.

The goals projected in this paper, the data developed in connection with them, and the conclusions drawn therefrom are applicable on only a nationwide scale. They should not be construed as applicable in specific institutions or areas in which local conditions or problems may warrant or even dictate a proportionately greater or smaller degree of expansion or effort than is needed for the Nation as a whole. The goals stated and the conclusions drawn are intended to facilitate evaluation of the full scope of effort in and support of higher education that will be required for the Nation's welfare and continued progress during the crucial decade of the sixties.

Office of Education Studies and Surveys

Higher Education in South Dakota

SOUTH DAKOTA has a new baseline for planning higher education in the State that should be of value to the agencies officially responsible for publicly controlled institutions and to the boards of control for the privately controlled institutions. It has been established by a recent survey supported by every college and university in the State—seven under public control and nine under private control.

Based on a projected 80-percent increase in numbers of students attending higher institutions in South Dakota between the fall of 1959 and 1970, the survey report calls for such actions as the following:

> Greater recognition and implementation of the State board of regents' authority and responsibility to govern and coordinate the statewide system of publicly controlled and supported higher education
>
> Strengthening of the policy of communication and cooperation between the publicly and privately controlled institutions of higher learning in the State and greater recognition of their effort as "partners in service to the people of South Dakota"
>
> Heightening of the levels of use of existing suitable instructional space (general classrooms and laboratories) as a basic initial step to projecting a long-range building program
>
> Greater coordination of specified instructional programs offered by the several institutions
>
> Establishment of a faculty retirement program in the State system of institutions and significant increases in salaries in both publicly and privately controlled institutions
>
> Revision of fiscal and budgetary procedures which now place undue authority on State agencies other than the regents of education.

The published report consists of three volumes. Volume I, *Summary of Major Findings and Conclusions and Recommendations*, presents an overview of the complete survey and the recommendations, over a hundred in all, submitted to the sponsoring agencies. Chapters in Volume II, *Enrollments, Setting, Structure, and Administration*, describe the background setting, the present status of higher education in the State, and factors in college attendance on which future enrollments can be projected. Other chapters deal with statewide government, planning, and coordination of higher education; general institutional government, planning, and development; use and condition of and needs for physical facilities; financing current operations; and financing capital construction. Volume III, *Students, Programs, Faculty, and Costs of Instruction*, deals with the characteristics of students who attend

higher institutions in South Dakota, the organization of student services; associate degree and preprofessional, undergraduate, graduate, and professional programs of instruction; libraries; summer session and extension programs; characteristics of faculty; academic working conditions; and costs of instruction.

The comprehensive survey was conducted by 17 staff members of the Division of Higher Education of the Office of Education under the joint auspices of the South Dakota Legislative Research Council, the State Board of Regents of Education, the South Dakota Association of Private Colleges, the Association of Private Junior Colleges, and the U.S. Office of Education. S. V. Martorana, Chief of the State and Regional Organization Section of the Office, directed the survey, and Ernest V. Hollis, Director of the College and University Administration Branch, acted as chief consultant.

The three volumes of findings and recommendations have been published by the South Dakota Legislative Research Council. Copies in limited supply may be obtained from the council (Pierre, S. Dak.) or from S. V. Martorana, Office of Education, Department of Health, Education, and Welfare, Washington 25, D.C.

Higher Education Planning

A RECENTLY PUBLISHED OE publication presents an analytical summary of 153 recent statewide and intrastate studies concerned with higher education planning. The bulletin, *Advance Planning to Meet Higher Education Needs: Recent State Studies (1956–1959)*, by S. V. Martorana and James C. Messersmith, updates an Office of Education survey[1] made in 1955.

Individuals and groups who are charged with the responsibility of planning, financing, and directing higher education in the years ahead, and who wish to examine recent efforts made elsewhere, should find this publication useful as a ready resource reference.

The survey data presented in the analytical summary table are arranged in a State-by-State sequence. Types of studies (*special studies and continuing staff studies*) are indicated, as well as the institutions included, sponsoring agencies, comprehensiveness of the studies, funds authorized for the studies, availability of reports, and other related information.

Although a number of States have made studies of their needs in faculty, finance, plant, and other areas in higher education, most States still would find it profitable to give increased attention to such requirements on both a current and a long-range basis. The report stresses the necessity for coordinated planning by both public and nonpublic higher education institutions.

[1] Ernest V. Hollis and S. V. Martorana, "Advance Planning for Higher Education in the United States," *Higher Education*, vol. 12, No. 7 (March 1956), p. 101–108.

Utilization of Teaching Resources

MANY colleges and universities are experimenting with improved methods of learning and curriculum patterns designed to raise the quality of instruction and to make more effective use of teaching resources. These developments include interdisciplinary approaches, year-round calendars, and new ways of measuring the effectiveness of the college experience.

Quest for Quality—Some Models and Means, the seventh in OE's series, "New Dimensions in Higher Education," summarizes research in this area and describes a number of experimental programs in sufficient detail to give interested readers an understanding of what is being done.

The bulletin was prepared by Samuel Baskin, under the editorship of Winslow R. Hatch of the OE Clearinghouse of Studies on Higher Education. Dr. Baskin, as director of educational research at Antioch College, has been in close touch with the experimentation not only at Antioch but also at many other institutions.

Cooperative Research Reports Available on Library Loan

FINAL REPORTS of the projects completed under the Cooperative Research Program of the U.S. Office of Education can now be borrowed from any one of 55 libraries—38 at colleges and universities—under a Library of Congress "Documents Expediting Project." (Final reports are not available for distribution by the Office of Education.) The following reports in the field of higher education are available through the library loan project:

BEARDSLEE, DAVID, and DONALD D. O'DOWD. College Student

Images of a Selected Group of Professions and Occupations. Wesleyan Univ., July 22, 1960. No. 562(8142).

COOK, WALTER W. (RUTH E. ECKERT, principal investigator.) A study of the Job Motivations, Activities, and Satisfactions of Present and Prospective Women College Faculty Members. Univ. of Minnesota, July 21, 1960. No. 557(8201).

DRESSEL, PAUL L., and others. Critical Thinking, Attitudes, and Values in Higher Education. Michigan State Univ., Jan. 15, 1960. No. 372(7668).

ECKERT, RUTH E., and JOHN E. STECKLEIN. An Exploratory Study of Factors Influencing Choice of College Teaching as a Career. Univ. of Minnesota, March 28, 1958. No. 169(6442).

EDSON, WILLIAM H., and ROGER E. WILK. An Experimental Study of the Admissions Interview in Teacher Education for Predicting Success in Teaching. Univ. of Minnesota, Dec. 19, 1958. No. 173(6438).

HEWES, ROBERT E., and RICHARD W. WILLARD. Investigation of the Use of Statistics in Counseling Students. Massachusetts Institute of Technology, May 18, 1960. No. 336(7665).

KELLY, J. T., and J. D. WHITE. Florida Study of Teacher Education: An Evaluation of the Pre-service Program. Univ. of Florida, May 27, 1958. No. 156(6458).

LANSING, JOHN B. Contributions by Parents to the Cost of Higher Education. Univ. of Michigan, Nov. 30, 1960. No. 708(8375).

LITTLE, J. KENNETH, and others. Factors Which Influence Decisions of Youth about Education Beyond High School: Follow-up Studies. Univ. of Wisconsin, April 4, 1960. No. 485(8030).

REYNOLDS, JAMES W. Development of Community Centered Programs in Junior Colleges. Univ. of Texas, June 1959. No. 333(7288).

Libraries Participating

Here are the libraries participating in the Library of Congress Expediting projects, listed in alphabetical order by State:

Univ. of Alabama
University, Ala.

California State Library
Sacramento 9, Calif.

San Diego State Coll.
San Diego 15, Calif.

Univ. of California
The General Library
Berkeley 4, Calif.

Univ. of California
Los Angeles 24, Calif.

Library of Congress
Washington 25, D.C.

Univ. of Nebraska
Lincoln 8, Nebr.

Dartmouth Coll.
Hanover, N.H.

Princeton Univ.
Princeton, N.J.

Rutgers Univ.
New Brunswick, N.J.

Brooklyn Public Library
Brooklyn 17, N.Y.

Columbia Univ.
New York 27, N.Y.

Florida State Univ.
Tallahassee, Fla.

Univ. of Hawaii
Honolulu, Hawaii

Midwest Inter-Library Ctr.
Chicago 37, Ill.

Northwestern Univ.
Evanston, Ill.

Univ. of Chicago
Chicago 37, Ill.

Univ. of Illinois
Urbana, Ill.

Indiana State Library
Indianapolis 4, Ind.

Indiana State Teachers Coll.
Terre Haute, Ind.

Indiana Univ.
Bloomington, Ind.

Purdue Univ.
Lafayette, Ind.

Kansas City Public Library
Kansas City, Kans.

Univ. of Kansas
Lawrence, Kans.

Enoch Pratt Free Library
Baltimore 1, Md.

Johns Hopkins Univ.
Baltimore 18, Md.

Detroit Public Library
Detroit 2, Mich.

Kalamazoo Coll.
Kalamazoo, Mich.

Michigan State Univ.
East Lansing, Mich.

Univ. of Michigan
Ann Arbor, Mich.

Univ. of Minnesota
Minneapolis 14, Minn.

Kansas City Public Library
Kansas City, Mo.

Univ. of Missouri
Columbia, Mo.

Cornell Univ.
Ithaca, N.Y.

New York Public Library
New York 18, N.Y.

New York State Library
Albany, N.Y.

United Nations Library
New York, N.Y.

Duke Univ.
Durham, N.C.

North Carolina State Coll.
Raleigh, N.C.

Kent State Univ.
Kent, Ohio

Miami Univ.
Oxford, Ohio

Oklahoma State Library
Oklahoma City 5, Okla.

Oklahoma State Univ.
Stillwater, Okla.

Carnegie Library, Pittsburgh
Pittsburgh 13, Pa.

Free Library of Philadelphia
Philadelphia 3, Pa.

Lehigh Univ.
Bethlehem, Pa.

Penn State Univ.
University Park, Pa.

Brown Univ.
Providence 12, R.I.

Univ. of Tennessee
Knoxville 16, Tenn.

Dallas Public Library
Dallas, Tex.

Univ. of Virginia
Charlottesville, Va.

Univ. of Washington
Seattle 5, Wash.

Washington State Univ.
Pullman, Wash.

Milwaukee Public Library
Milwaukee 3, Wis.

Univ. of Wyoming
Laramie, Wyo.

Projects in Progress

In addition to the reports listed above, *the following Cooperative Research projects in the field of higher education are currently under contract and in progress*

(as these projects are completed, they will become available through the Library of Congress project):

DRESSEL, PAUL L. Critical Thinking, Attitudes and Values in Higher Education. Michigan State Univ. No. 590.

FOSTER, JULIAN F. S. The Impact of a Value-Oriented University; Changes in Student Attitudes and Thinking During Their College Careers. Univ. of Santa Clara. No. 729.

FREEDMAN, MERVIN B. Measurement and Evaluation of Change in College Women. Vassar College. No. 736.

GRUBER, HOWARD E. Self-Directed Study: An Experiment in Higher Education at the University of Colorado. Univ. of Colorado. No. 761.

HOLLIS, E. V. Factors Related to Application, Admission, Registration, and Persistence in College. U.S. Department of Health, Education, and Welfare. No. 166.

MCCONNELL, T. R. The Influence of Different Types of Public Institutions of Higher Learning on College Attendance of Students from Varying Socioeconomic and Ability Levels. Univ. of California. No. 438.

PACE, ROBERT C., and GEORGE G. STERN. Studies of College Environments. Syracuse Univ. No. 378.

PLANT, WALTER T. Personality Changes Associated with a College Education. San Jose State College. No. 348.

THISTLETHWAITE, DONALD L. Factors Influencing the Recruitment and Training of Intellectually Superior Students in Higher Educational Programs. Northwestern Univ. No. 657.

Program Notes

Science Teachers To Participate in Research Opportunities

THE National Science Foundation has granted about $700,000 to 41 educational institutions to provide research participation programs for 350 college teachers of science, and $618,000 to 47 institutions for programs for 310 high school teachers. Both programs will enable teachers to help carry out the research projects of a university or college department and to work directly with the researchers in charge of the projects.

The research programs will provide opportunities for professional advancement to teachers who have the required training but who need the stimulation of and the identity with science that research participation can provide. The grants are expected not only to increase the effectiveness of science teaching, but to increase the numbers of active investigators of fundamental scientific problems.

A candidate for the college teachers' program must hold a master's degree in the field in which he proposes to work and must work in a department offering the doctorate. Research participation opportunities are also available for teachers holding a doctorate.

Most of the research is expected to be carried out during the summer in programs lasting from 8 to 12 weeks. Six grants, however, will allow the participant to continue his work during the academic year. Nine of the grants are for an experimental 2-year period to permit planning and scheduling of more elaborate projects.

Participating teachers with a Ph. D. may receive stipends of up to $100 a week during the summer plus allowances for travel and dependents. Those holding a master's degree are limited to stipends of $75 a week.

Research programs for high school teachers will be of 8 to 12 weeks duration during the summer. Teachers must hold, or be able to qualify as a candidate for, the master of science degree. Eighty-six teachers will be allowed academic-year extensions of their work at their home schools. The programs will be in most of the scientific fields, including geology and engineering. Secondary school teachers will receive stipends of up to $75 a week during the summer plus allowances for travel and dependents.

Participants for either program will be chosen by the cooperating institutions. Lists of participating institutions are available from the National Science Foundation.

Federal Support of Scientific Research and Development, Fiscal 1961

THE NATIONAL SCIENCE FOUNDATION has recently reported that the Federal Government will obligate an estimated $9.1 billion during fiscal year 1961 for the support of scientific research and development: $8.5 billion for conducting research and

development and $600 million for increase of R&D plant. About $850 million of the $8.5 billion—10 percent—of funds for conducting research and development was marked for basic research in fiscal year 1961.

The 1961 total of $9.1 billion compares with obligations of $7.4 billion in 1959 and an estimated $8.6 billion in 1960, according to *Federal Funds for Science, IX; The Federal Research and Development Budget, Fiscal Years 1959, 1960, and 1961*, issued by NSF. The publication presents detailed information on obligations for conducting research and development from several points of view: Administering agencies, the performers of research and development, and the character of the work. It presents Federal funds for scientific R&D programs in terms of both *obligations* and *expenditures* for the 3-year period. The level of *expenditures* denotes the more immediate impact of Federal spending upon the national economy, while the *obligations*, representing commitments made by the government for future payment, indicate planned levels of R&D support.

This report, the ninth in the series, introduces new information: A distribution of data (for both basic and total research) under more detailed fields of science than in previous years, the identification of the Federal support of research and development abroad, and the reexamination of the summary data for fiscal year 1961 to reflect congressional action on the President's budget and subsequent administrative decisions.

In fiscal year 1961, three agencies—the Department of Defense, the Atomic Energy Commission, and the National Aeronautics and Space Administration—are expected to administer an estimated 90 percent, or $7.6 billion, of the total obligations for conducting research and development. These agencies also accounted for the same percentage of total in fiscal year 1960.

The Federal Government obligated for conducting research and development in 1959 an estimated $617 million to educational institutions, including the Federal contract research centers administered by them, and an estimated $846 million in 1960 and $879 million in 1961. As shown in table 1, the obligations for educational institutions proper for these 3 years are $356 million for 1959, and estimated totals of $464 million for 1960 and $489 million for 1961. The totals for educational institution research centers for the 3 years are $261 million for 1959, $382 million (estimated) for 1960, and $390 million (estimated) for 1961.

Table 1.—Obligations to educational institutions for conducting research and development, by agency, fiscal years 1959, 1960, and 1961

[Millions of dollars]

Agency	Actual 1959	Estimates	
		1960	1961
At educational institutions proper			
Total	$356	$464	$489
Department of Defense	127	162	154
Atomic Energy Commission	29	42	49
Department of Health, Education, and Welfare	110	156	165
National Aeronautics and Space Administration	10	8	15
National Science Foundation	43	60	69
All other agencies	36	36	37
At educational institution research centers			
Total	261	382	390
Department of Defense	72	99	88
Atomic Energy Commission	182	226	235
National Aeronautics and Space Administration	7	56	67

NOTE: Detail may not add to totals because of rounding.

NSF Research Grants for Undergraduates

THE NATIONAL SCIENCE FOUNDATION recently made available $3.2 million in 357 grants which will make it possible for a comparatively small number of highly selected undergraduate students to work alongside scientists in more than 250 colleges and universities, beginning next summer.

The Foundation has made the grants available through its undergraduate research participation program to stimulate the interest of superior students in research, to widen their understanding of the scientific method, and to improve their ability to use scientific investigative procedures.

Each student will have an opportunity to do

scientific research, either as an individual working under the direct supervision of an established scientist or as a member of a team working directly with a scientist. About 37 percent of the students will work in chemistry, 26 percent in the biological sciences, 13 percent in engineering, 12 percent in physcis, and the others in astronomy, geology, mathematics, psychology, and the quantitative social sciences.

Students receive nominal stipends while they are engaged in the research programs. They are chosen on the basis of applications made to the institutions conducting the programs. Lists of institutions may be obtained from the National Science Foundation.

AEC To Sponsor Summer Institutes for College Teachers

THE ATOMIC ENERGY COMMISSION will sponsor an 8-week institute in nuclear physics for about 20 physics teachers of small colleges. The institute, to be held at Oak Ridge, Tenn., from June 26 to August 18, will be conducted by the Oak Ridge Institute of Nuclear Studies (ORINS) in cooperation with Oak Ridge National Laboratory (ORNL).

The institute course will cover a review of basic concepts, current activities in the field, nuclear energy equipment, and the development of college courses on the subject. The training will consist of lectures by Oak Ridge scientists, with laboratory work and demonstrations both at ORINS and at ORNL.

Leaders of the summer institute will include Alvin M. Weinberg, Director of ORNL, and J. L. Fowler, L. D. Roberts, Paul H. Stetson, and Harold C. Schweinler, all of the ORNL staff; and William G. Pollard, Executive Director of ORINS, and Ralph T. Overman, Chairman of the ORINS Special Training Division.

ORINS, an organization of 38 colleges and universities, conducts training and research in the nuclear energy field under contract for the AEC.

The teachers will be selected from all parts of the country on the basis of their applications. Further information and application blanks are available from the Atomic Energy Institute, University Relations Division, Oak Ridge Institute of Nuclear Studies, Post Office Box 117, Oak Ridge, Tenn.

NEW PUBLICATIONS

Government Publications

How To Obtain

(*1*) *Cost Publications: Send request, enclosing remittance (check or money order), to the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.*

(*2*) *Free Publications: Request direct from the agency issuing them.*

From the Office of Education

Studies of Home Economics in High School and in Adult Education Programs 1955–58, by Ivol Spafford and Edna P. Amidon. Washington, U.S. Government Printing Office, 1960. Paper, 185 p. 70 cents. (OE–83005.)

Education for Africans in Tanganyika, by Betty George. Washington, U.S. Government Printing Office, 1960. Paper, 97 p. 40 cents. (OE–14039.)

Student Financial Aid in Higher Education—An Annotated Bibliography, by Walter C. Eells and Ernest V. Hollis. Washington, U.S. Government Printing Office, 1960. Paper, 87 p. 35 cents. (OE–53006.)

Advance Planning to Meet Higher Education Needs—Recent State Studies 1956–1959, by S. V. Martorana and James C. Messersmith. Washington, U.S. Government Printing Office, 1960. Paper, 33 p. 30 cents. (OE–53007.)

Library Statistics of Colleges and Universities, 1959–60 (Part 1: Institutional Data), by John Carson Rather and Doris C. Holladay. Washington, U.S. Government Printing Office, 1961. Paper, 79 p. 50 cents. (OE–15023.)

National Defense Graduate Fellowships: Approved Graduate Programs 1961–62 (Title IV—National Defense Education Act). Washington, U.S. Government Printing Office, 1961. Paper, 25 p. (OE–55017.)

Quest for Quality, New Dimensions in Higher Education, No. 7, by Samuel Baskin and W. R. Hatch. Washington, U.S. Government Printing Office, 1960. Paper, 18 p. 15 cents. (OE–50016.)

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From Other Government Agencies

National Science Foundation: 10th Annual Report, 1960. Washington, U.S. Government Printing Office, 1961. Paper, 310 p. $1. (NSF–61–1.)

Summarizes the Foundation's programs in support of basic research and education in the sciences, its activities in the dissemination of scientific information, and its participation in special international scientific programs. The final chapter deals with NSF responsibilities in measuring and appraising the national research and development effort, 1953–60.

Federal Funds for Science IX; The Federal Research and Development Budget, Fiscal Years 1959, 1960, and 1961. Washington, U.S. Government Printing Office, 1960. Paper, 89 p. 50 cents. (National Science Foundation, NSF 60–80.)

Nongovernment Publications

Obtain direct from the publisher. Prices are indicated when known.

A Guide to Graduate Study—Programs Leading to the Ph. D. Degree (second edition). Frederic W. Ness, editor. Washington, The American Council on Education, 1960. 457 p. $6.

A directory of programs leading to the Ph. D. degree offered by 174 colleges and universities in the United States. Part I, "Graduate Study and the Undergraduate," discusses topics of major concern to the undergraduate in reaching a decision on graduate study. Part II consists of institutional exhibits describing the instructional programs leading to the Ph. D. degree: admission requirements, fields of study, areas of specialization within fields, residence requirements, and other pertinent data. Indexed by fields of study.

The Land-Grant College and State University in the United States—a guide for foreign students. 1 East 67th Street, New York 21, N.Y. Institute of International Education, October 1960. Paper, 12 p. 15 cents.

Provides information on college preparation, program offerings, methods of instruction, units of study, and other academic features of the land-grant college and State university. Discusses costs and cites references dealing with scholarships, fellowships, and other forms of financial assistance. The appendix lists member institutions of the American Association of Land-Grant Colleges and State Universities and of the State Universities Association. Listings include type of control, level of studies offered, composition of student body, and recent data on number of foreign students enrolled and total enrollments.

Normative Data on the Utilization of Instructional Space in Colleges and Universities, by James I. Doi and Keith L. Scott, 1960. Paper, 24 p. (Requests for copies should be directed to the American Council on Education, 1785 Massachusetts Ave., Washington, D.C.)

Study Abroad (Vol. XII). Paris, France: United Nations Educational, Scientific and Cultural Organization, 1960. Paper, 768 p. $3.00 (UNESCO Publications Center, 801 Third Avenue, New York 22, New York.)

The 12th edition of an international handbook of fellowships, scholarships, and educational exchange. Contains information on some 100,000 individual opportunities for international study and travel in 1960–61 and 1961–62, offered by 1,761 awarding agencies in 115 States and Territories. Available scholarships and fellowships cover many fields and all levels of education, ranging in duration from about 2 weeks to 8 years. Also contains a report on the eighth survey undertaken by UNESCO on foreign student enrollment in institutions of higher education throughout the world, showing a total of 200,000 foreign students during 1958–59. Presents statistical analysis of the awards reported in the last edition. One chapter is devoted to organizations offering advisory services and practical help to persons seeking assistance and advice in connection with their studies in foreign countries, quite apart from any financial help they may be requesting.

The University and World Affairs, by the Committee on The University and World Affairs. 477 Madison Avenue, New York 22, N.Y. The Ford Foundation, 1960. Paper, 84 p.

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